BELL WORK
12-Nov-2015

With your best effort try to describe what a semiconductor is? Use complete sentence and if desired you may reference a sketch

EQ: with so many source of energy why do you limit yourself to the one you are currently using?

Objectives

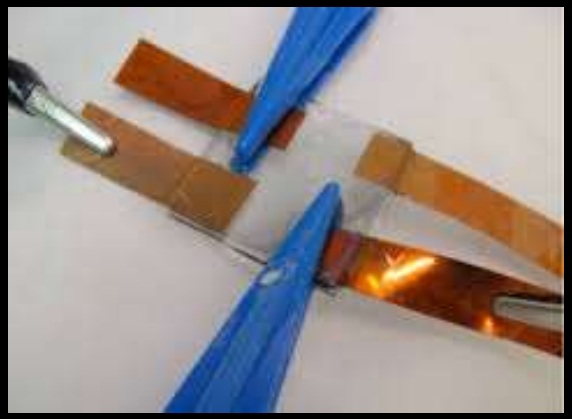
Make an electrolyte gel for use next block day.

Preparation of Gel Electrolyte…

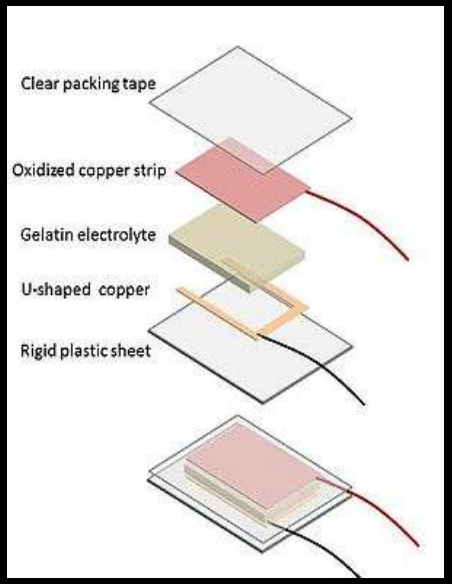
Lab,

See hand out.

Safety First!



pages.vassar.edu



http://photonicswiki.org

Semiconductor

https://youtu.be/33vbFFFn04k

Quick Quiz #5

1. What are the first four elements in the halogens?

2, The periodic table can be split into two groups: _____ and _____

3. The elements can be split into Three classes, what are they?

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13-Nov-2015

What are the three classes of elements?

metals **nonmetals** **metalloids**

What is the general trend for electronegativity on the periodic table?

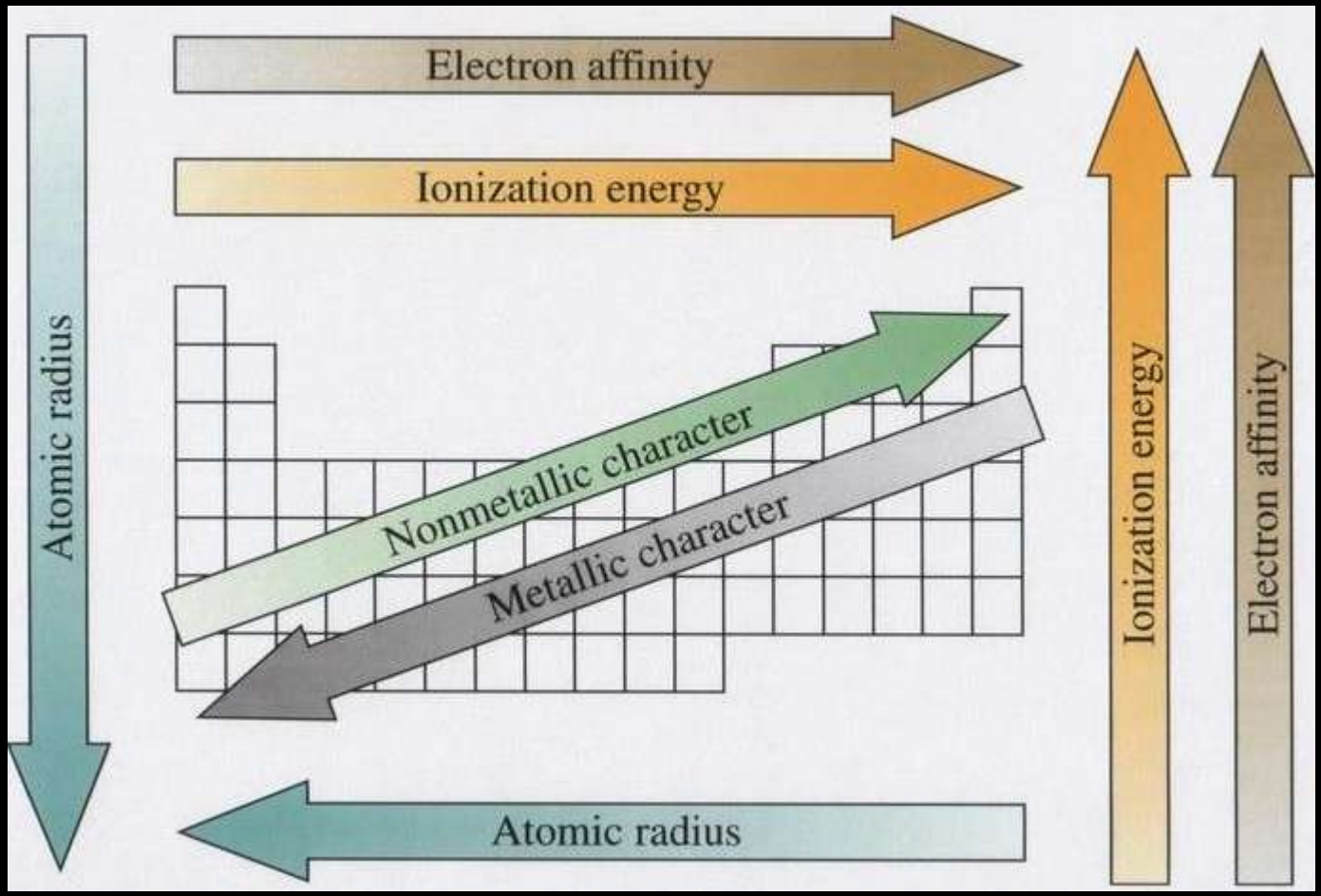
EQ: with so many source of energy why do you limit yourself to the one you are currently using?

Objectives

Know the four (4) principal quantum numbers

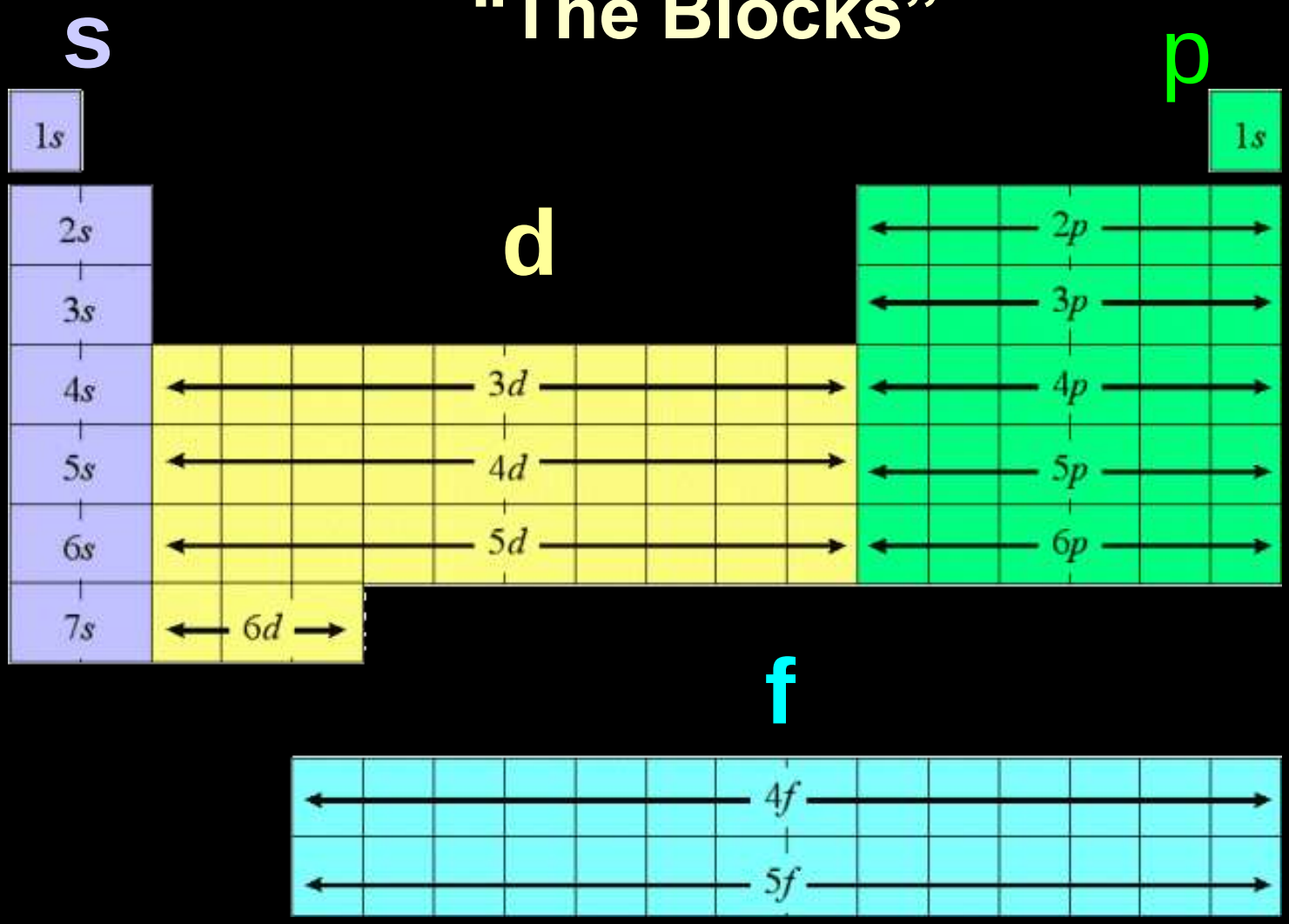
Fill Out an orbital and electron configuration diagram

Periodic Trends

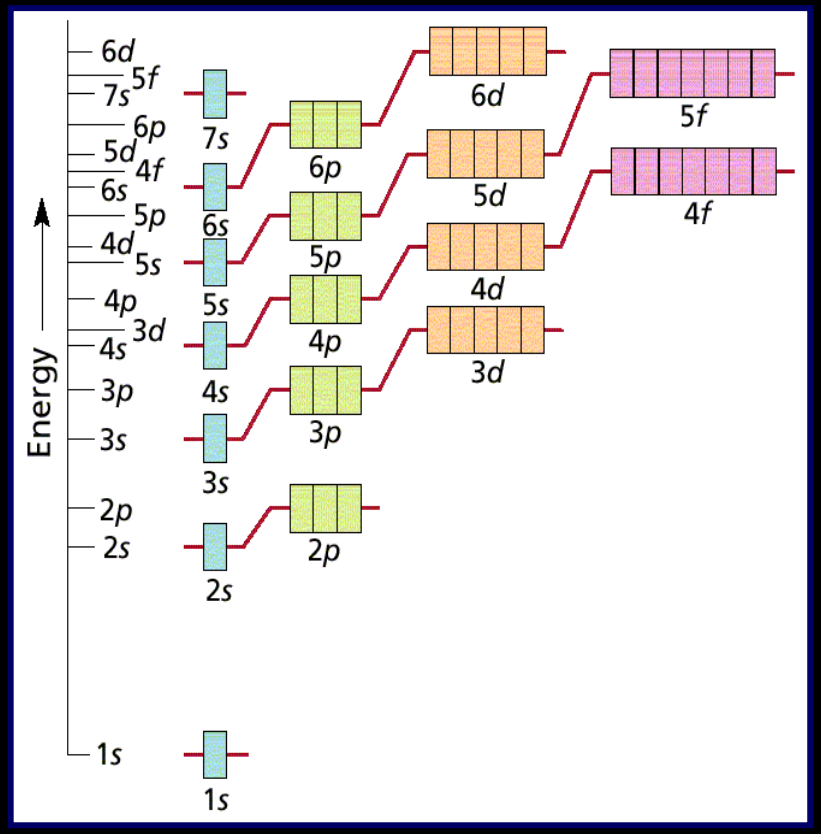


Electron Configuration

"The Blocks"



Electrons in Atoms



Electron Configuration

(p. 117 – 131
Reading hw for tonight)

Labeling Period Table for Electron Configuration

http://www.youtube.com/watch?v=8TZ97JLWqMA&feature=relatedn

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16-Nov-2015

Objective

You will be able to recall:

4 quantum numbers,

# of electrons in each orbital,

Aufbau principle,

Hunds Rule,

and Pauli exclusion principle

Arrangement of e^- in Atoms

e^- in atoms are arranged as:

SHELLS (n)

SUBSHELLS (l)

ORBITALS (m_l)

The location of an electron can be predicted by using the four (4) quantum numbers

Arrangement of e^- in Atoms

Each orbital (m_l) can be assigned no more than 2 electrons!

This is tied to the existence of a 4th quantum number, the e^- spin quantum number, m_s.

The Orbital's

The “s” block has one (1) orbital

The “p” block has three (3) orbital's

The “d” block has five (5) orbital's

The “f” block has seven (7) orbital's

Lets look at/ count them on the periodic table

General Rules

Pauli Exclusion Principle

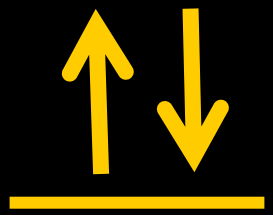
No two electrons in the same atom can have the same set of 4 quantum numbers.

That is, each electron in an atom has a unique address of quantum numbers.

General Rules

Pauli Exclusion Principle

Each orbital (m_l)can hold **TWO (2)** electrons with opposite spins.

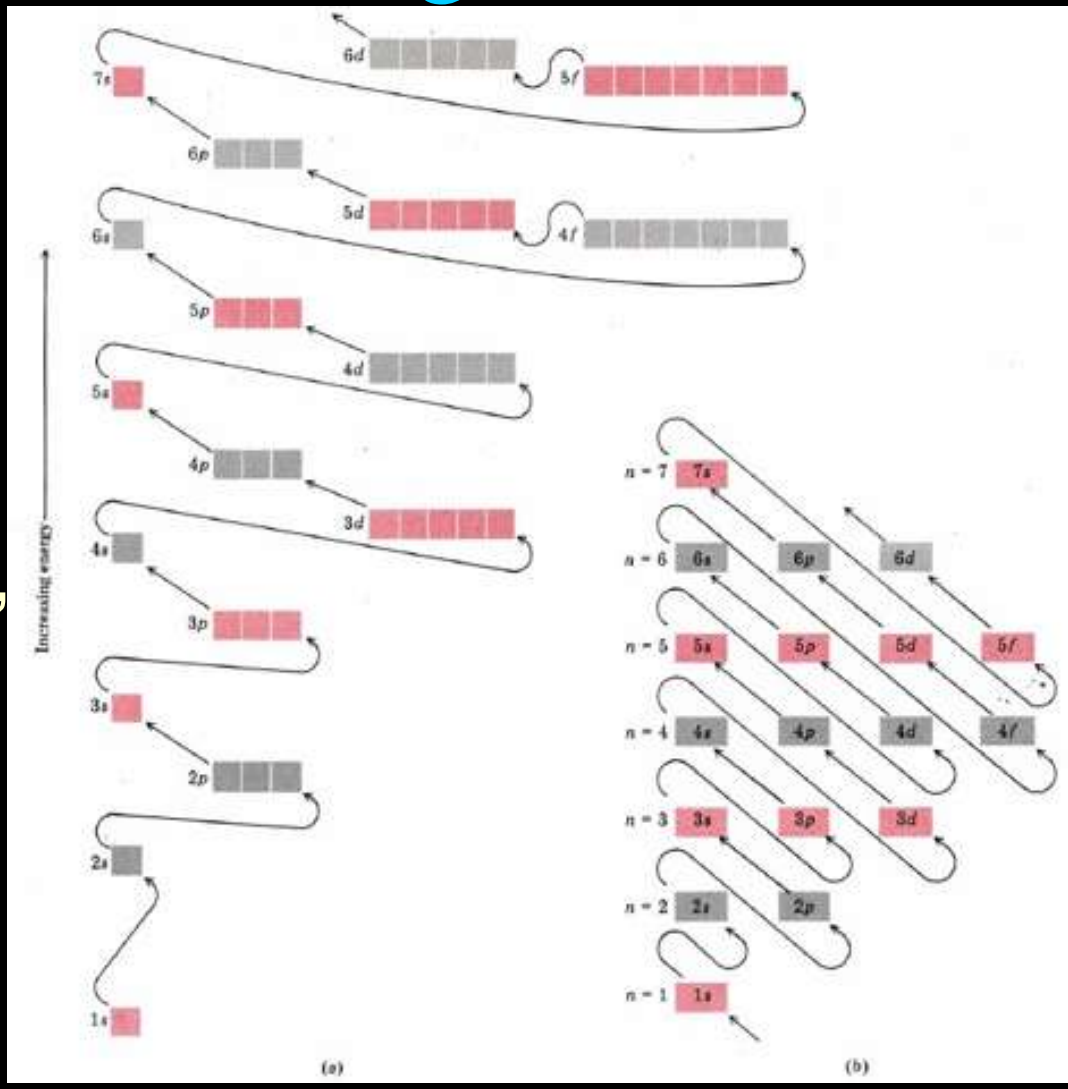


General Rules: Filling Order

Aufbau Principle

e^- fill the lowest energy orbitals first.

"Lazy Tenant Rule"

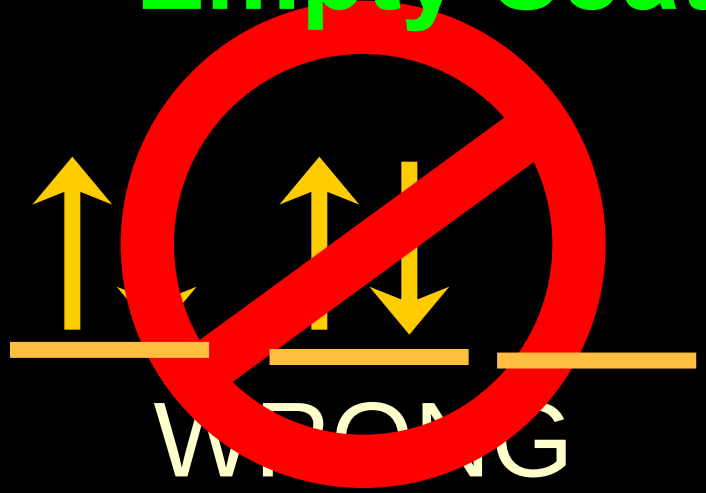


General Rules

Hund's Rule

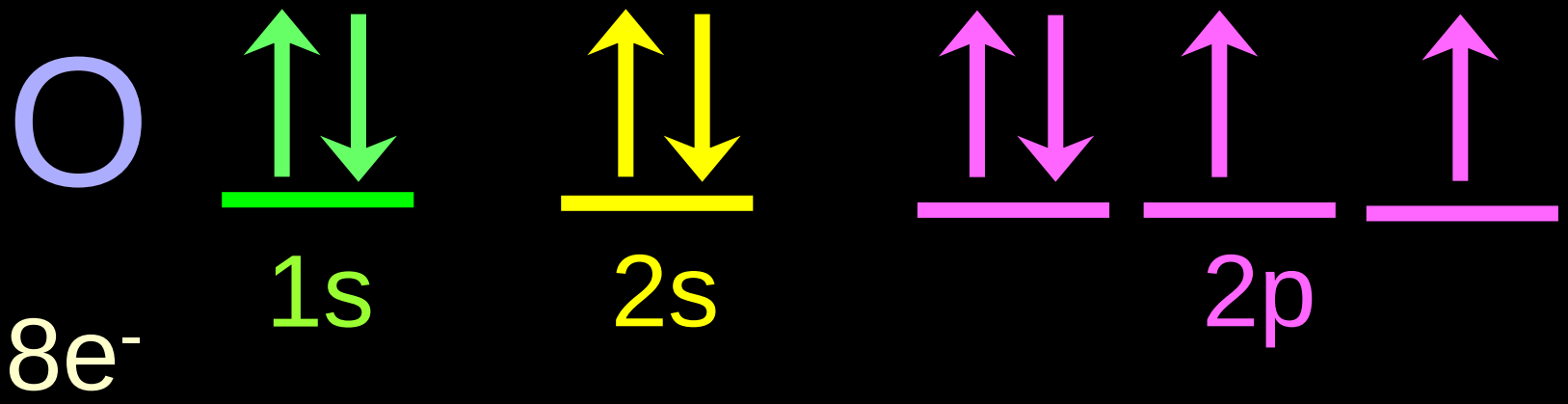
Within a sublevel, place one e^- per orbital before pairing them.

"Empty Seat Rule"



Notation

Orbital Configuration: Uses arrows



Electron Configuration: Uses supper scripts

$1s^2\ 2s^2\ 2p^4$

Notation

Longhand Configuration

S 16e$^-$ $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^4$

Core Electrons **Valence Electrons**

Shorthand Configuration

S 16e$^-$ [Ne] $3s^2\ 3p^4$

Valence electrons

Valence electrons are the ***electrons*** contained in the outermost, or "***valence***", ***electron*** shell of an atom.

They are involved in the bonding between atoms

$1s^2$ $2s^2$ $2p^6 3s^2 3p^3$

Practice…

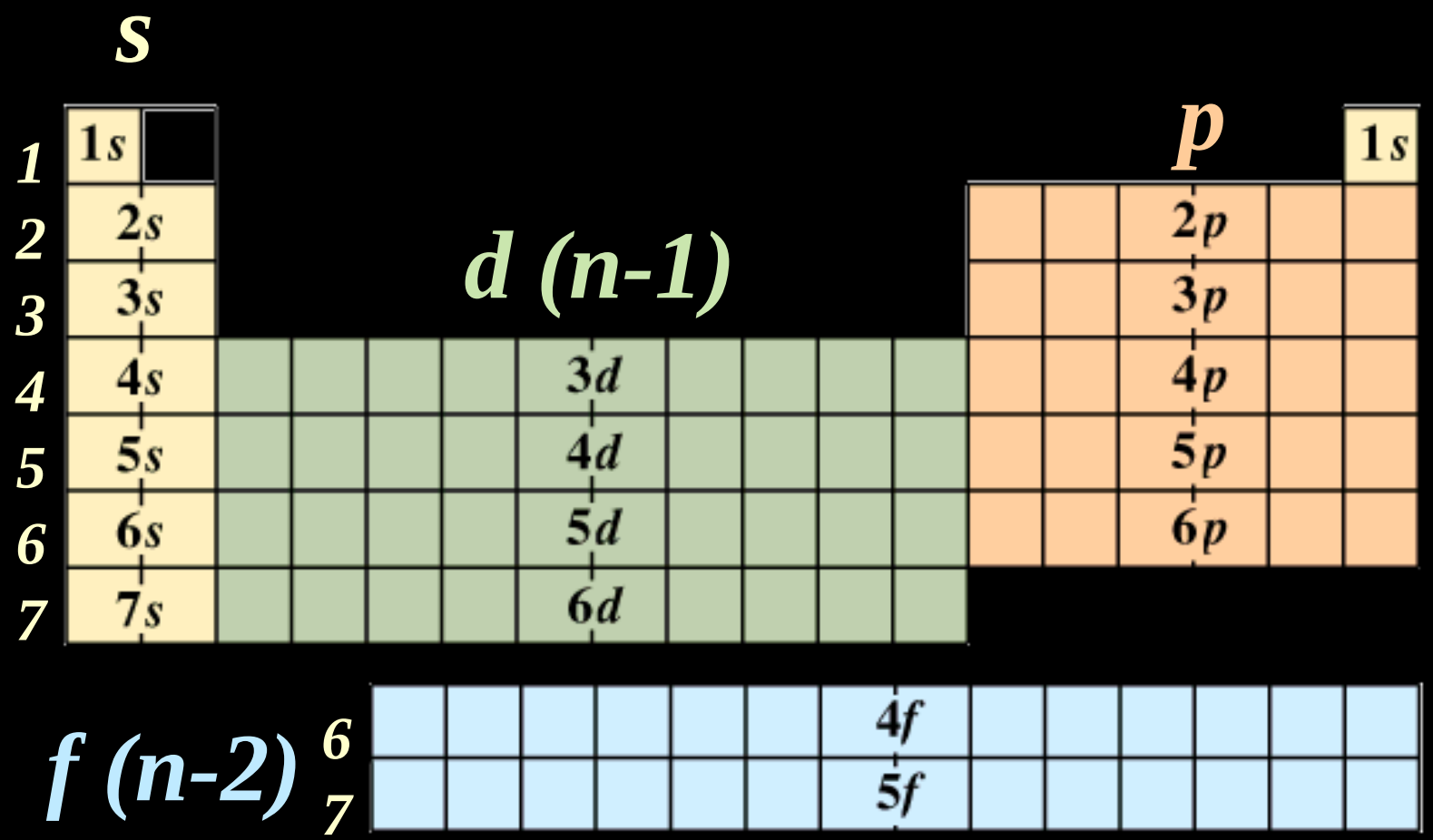
Give the Longhand Configuration for

P **$15e^-$** $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^3$

Give the Shorthand Configuration for

Br **$35e^-$** **[Ar] $4s^2\ 3d^{10}4p^5$**

Periodic Patterns



Periodic Patterns

Period #

energy level (subtract for d & f)

A Group #

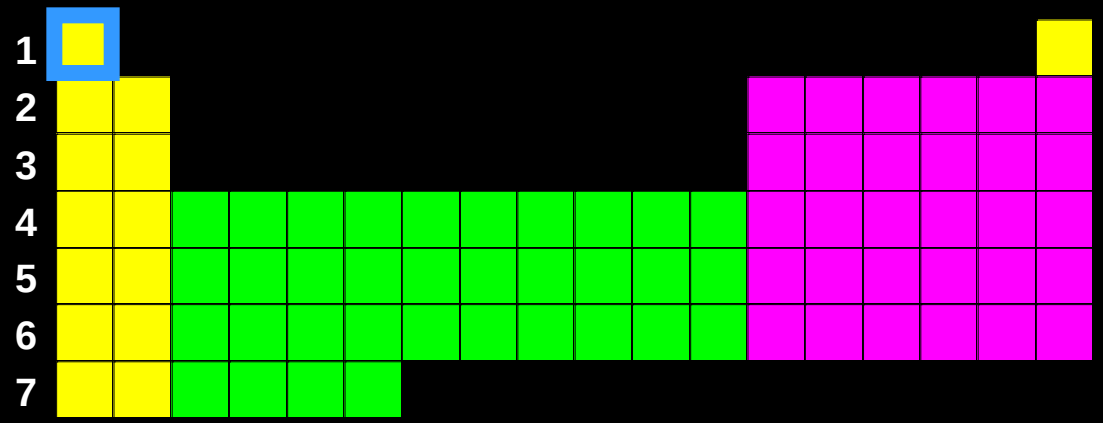
total # of valence e^-

Column within sublevel block

of e^- in sublevel

Periodic Patterns

Example - Hydrogen



$1s^1$ ← 1st column of s-block

1st Period ↑

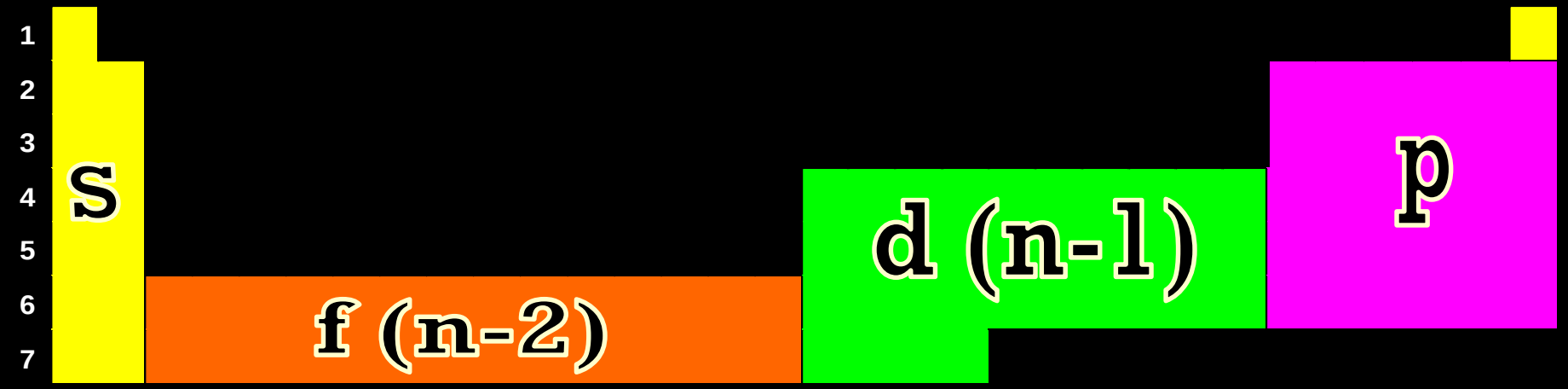
↑ s-block

Periodic Patterns

Shorthand Configuration

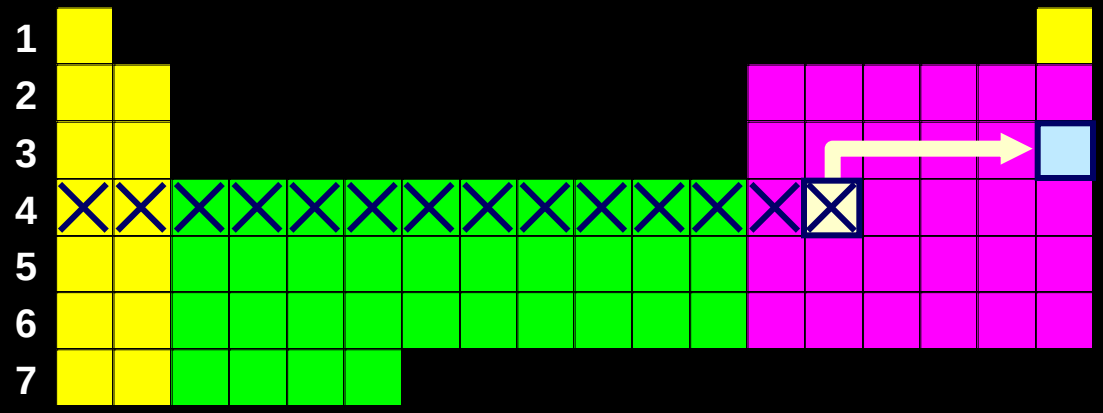
Core e⁻: Go up one row and over to the Noble Gas.

Valence e⁻: On the next row, fill in the # of e⁻ in each sublevel.



Periodic Patterns

Example - Germanium



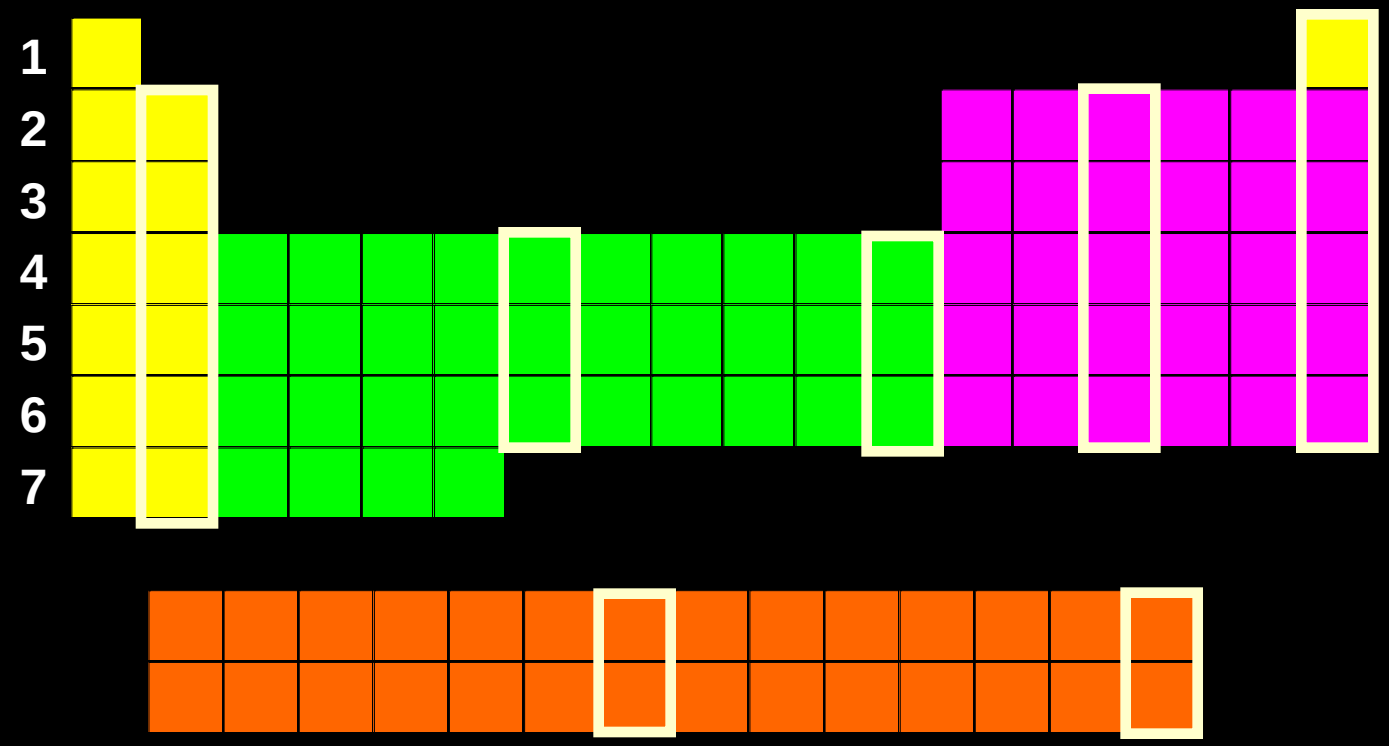
$$[Ar]\ 4s^2\ 3d^{10}\ 4p^2$$

Stability, See page 152 in text

Full energy level

Full sublevel (s, p, d, f)

Half-full sublevel



Before You Go

What “block” are the transition elements in?

The Periodic Table: An Activity

- Electron Configuration and Quantum Number

BELL WORK
17/18-Nov-2015

List the number of valence e^- for each;

Ca **Sb** **Br**

When you finish what is the first quantum number?

Objective:

You will practice drawing and writing orbital and electron configurations

Electron Configuration Practice

The Boom!

$H_2C_2\,(g) + O_2\,(g) \rightarrow CO_2\,(g) + H_2O(l)$

Before You Go

What are the outer electrons called?

Bell Work
3-Nov-14

How are group number and number of valence electrons related?

What is the trend for electronegativity?

Objective:

You will be able to DRAW the Lewis dot structure of any representative element and Noble gas.

Surprise #3

1. What is the frequency of light associated with a $3x10^{-4}$m wave length?
2. The energy of light is associated with a $3x10^{-4}$m wave is?
3. What is the trend of the periodic table for atomic radius? Use the word increase
4. What is the most electronegative alkaline earth metal?
5. The short hand electron configuration for Br

Surprise #3
2 points each

1. What is the frequency of light associated with a $3x10^{-4}$m wave length?

$1E^{12}$ Hz

2. The energy of light is associated with a $3x10^{-4}$m wave is?

$6.63E^{-22}$ J

3. What is the trend of the periodic table for atomic radius? Use the word increase

Increases down a group and right to left in a period

4. What is the most electronegative alkaline earth metal? Be

5. The short hand electron configuration for Br

[Ar] $4s^2 3d^{10} 4p^5$

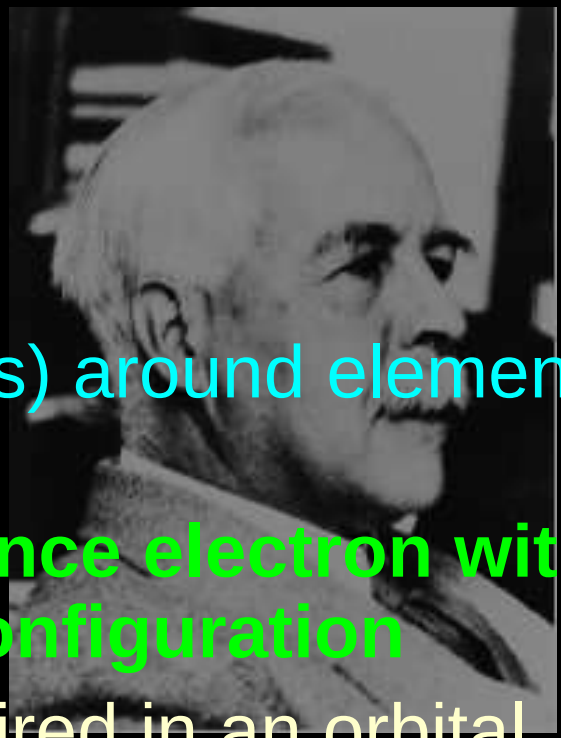
Tomorrow, 4-Nov-2-14

Meet in ~~computer lab Rm. 41~~.

Portal, Library

You assignment will be on the homework section of our class web page for the 4th of Nov.

Single Atom Lewis Structures



What do they look like?

Procedure

1. Write element symbol
2. Add valence electrons (dots) around element symbol

How can we determine valence electron with out writing the electron configuration

If valence electrons are paired in an orbital, pair them on the structure, if not, don't (keep them single)

How many valence electrons do the following atoms have?

Valence Electrons

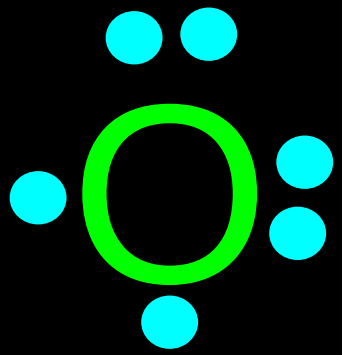
How many valence electrons do the following atoms have?

Cl C Al Mg K

Single Atom Lewis Structures

Procedure

1. Write element symbol: **O**
2. Add valence electrons (dots) around element symbol. **Oxygen has 6 valence electrons**

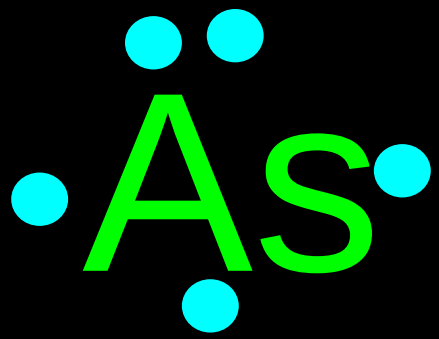


Single Atom Lewis Structures

Lets try another:

As

Identify the number of valance electrons ____



You try More Practice:

H, He, F, P, Mg, N, Kr

Test review, 7-Nov-2014

How do you calculate wavelength, frequency, and energy?

Drawing single atom Lewis dot structures

What are the trends on the periodic table?

What are the groupings on the periodic table based on electron configuration?

What are the four quantum numbers and how are they used?

What are the rules for electron filling/ distributions?

Book Review

Page	Problem
106	#44-48, 52
118, 125	#6-11
130	#15
149	#2, 3
157	#6, 7, 8
159	#15-17

Before You Go…

Think about why would it have been hard for Mendeleev to organize the periodic table in the same fashion as the modern one?

Bell Work
2-Nov-2012

What are the densities, electron configurations and dot diagrams for the following elements?

Ca, mass of 20g and volume of 12.9 cm^3

Cd, mass of 15g and volume of 1.7cm^3

W, mass of 10g and volume of 0.518 cm^3

Objective:

<u>Understand</u> how to write electron configurations for ions

You will be prepared for our test on Monday!

Some more practice…

Identify the following elements based on their electron configurations:

$1s^2 2s^2 2p^6 3s^2 3p^3$

$[Ar] 4s^1$

$1s^2 2s^2 2p^1$

$1s^2 2s^2 2p^5$

$[Ne] 3s^2$

$[Ne] 3s^2 3p^5$

$[Ar]\ 4s^2$

The Four Quantum Numbers

n → shell **1, 2, 3, 4, ...**

l → subshell 0, 1, 2, ... n - 1

l corresponds to a specific sub shell – so when l =0 it refers to s sublevel, when l =1 in refers to the p sublevel and so on.

m_l → orbital -l ... 0 ... +l

m_s → e^- spin +1/2 and -1/2

Quantum number

What element would fall in at these quantum numbers?

$n = 3, l = 2, m_l = -2, m_s = -1/2$

Stability

Electron Configuration Exceptions

Copper

EXPECT: [Ar] $4s^2$ $3d^9$

ACTUALLY: [Ar] $4s^1$ $3d^{10}$

Copper gains stability with a full d-sublevel.

Stability

Electron Configuration Exceptions

Chromium

EXPECT: $[Ar]\ 4s^2\ 3d^4$

ACTUALLY: $[Ar]\ 4s^1\ 3d^5$

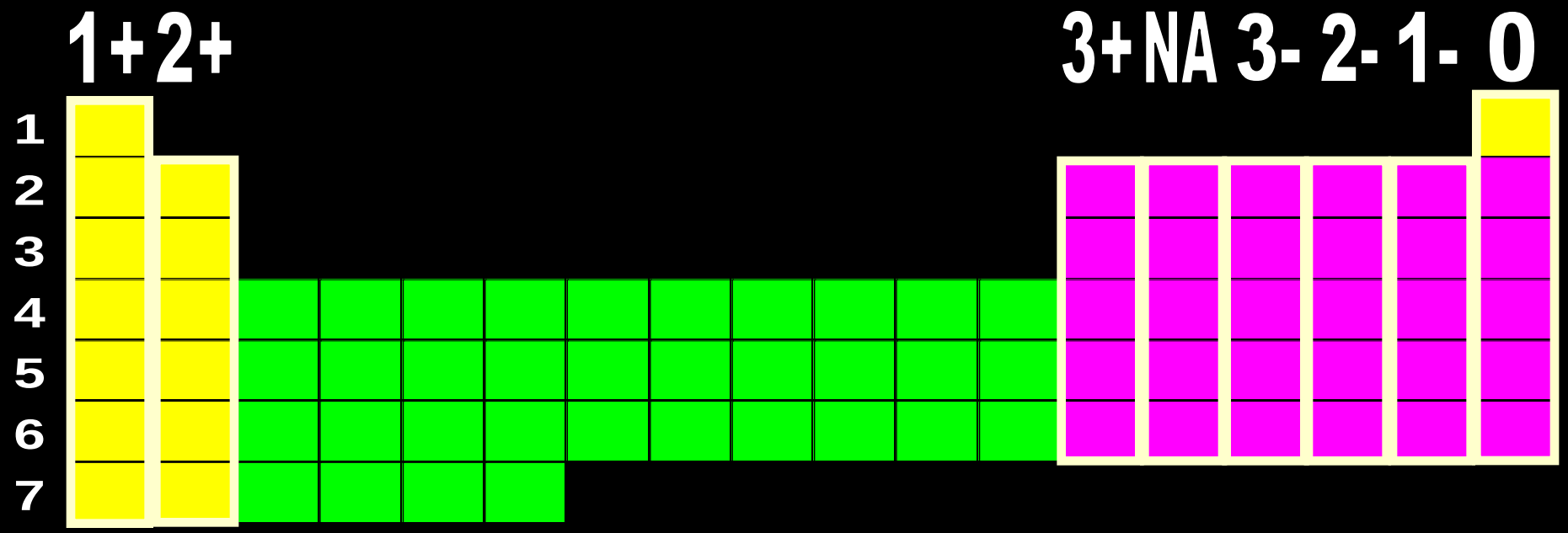
Chromium gains stability with a half-full d-sublevel.

Stability

Ion Formation

Atoms gain or lose electrons to become more stable.

Isoelectronic with the Noble Gases.



Stability

Ion Electron Configuration

Write the e^- config for the closest Noble Gas

EX: Oxygen ion $\rightarrow$ $O^{2-} \equiv$ Ne

O^{2-} $10e^-$ $[He]\ 2s^2\ 2p^6$

Ion configuration

What are the ion configurations for the following ions?

N^{3-}

Cl^{-}

Ca^{2+}

Practice

On the paper you that you completed your last HW assignment:

Do problems 62 and 63 on page 134 in your book.

If you finish early start reading pages 151-156 (it your HW tonight)

Bell Work
5-Nov-2012

Get out a blank sheet of paper, green sheet, calculator, and pencil.

Get a joke ready for the class?

Correction

$c = 3.00 \times 10^{8}$ m/s

#**20**a. Draw the Lewis dot structure for Barium (Ba) and iodine (I).

Bell Work
1-Nov-2013

Get your kit out for the test ☺

Green Sheet and Card, Calculator, and pencil/ pen